

Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. – 2. (canceled)

3. (currently amended) ~~The method of embedding digital watermark information according to Claim 2A~~ method of embedding digital watermark information $b_1 - b_n$ ($2 \leq n$) in image data, comprising the steps of:

dividing the image data into a plurality of areas S each consisting of $M \times N$ ($1 \leq M, N$) pixels;

defining an area G consisting of $P \times Q$ ($1 \leq P, Q$) of the areas S;

allocating each of the areas S constituting said area G to some one of: areas $T_1 - T_n$ whose pixel values are changed, areas $J_1 - J_k$ ($1 \leq k$) in which information $p_1 - p_k$ ($1 \leq k$) specifying an embedding format for embedding said digital watermark information $b_1 - b_n$ in said areas $T_1 - T_n$, and areas $H_1 - H_m$ ($1 \leq m$) whose pixel values are not changed;

corresponding each of said $T_1 - T_n$, whose pixel values are changed, to each of said digital watermark information $b_1 - b_n$ and changing the pixel value of each area T according to a bit value;

locating areas $T_1 - T_n$, areas $J_1 - J_k$ and areas $H_1 - H_m$ in a predetermined same arrangement in said area G; and

locating said area G repeatedly over entire image data,

wherein:

said digital watermark information $b_1 - b_n$ is embedded by increasing or decreasing pixel data values in the corresponding areas $T_1 - T_n$ according to a bit value (0, 1) of each bit of the digital watermark information $b_1 - b_n$; and

said information $p_1 - p_k$ specifying said embedding format is embedded such that said information indicates a pattern of respective increasing/decreasing directions in the area $T_1 - T_n$ for a bit value of the digital watermark information, in each area G to which the area $J_1 - J_k$ embedded with said information $p_1 - p_k$ belong.

4. – 6. (canceled)

7. (currently amended) A method of extracting digital watermark information, for extracting the digital watermark information $b_1 - b_n$ ($2 \leq n$), a bit value of the digital watermark information being 0 or 1, from image data in which said digital watermark information is embedded, comprising steps of:

dividing the image data into a plurality of areas S each consisting of $M \times N$ ($1 \leq M, N$) pixels; detecting areas $H_1 - H_m$ ($1 \leq m$) in which any of bit information 0 and 1 is not embedded, from said plurality of areas S;

recognizing a plurality of areas G each consisting of $P \times Q$ ($1 \leq P, Q$) of the areas S, said plurality of areas G being located on said image data, and said recognition being carried out by comparing locations of said detected areas $H_1 - H_m$ on said image data and locations of predetermined areas $H_1 - H_m$ in the areas S;

in each of the plurality of areas G recognized, extracting information $p_1 - p_k$ ($1 \leq k$) from areas $J_1 - J_k$ in which said information $p_1 - p_k$ ($1 \leq k$) in which said information $p_1 - p_k$ ($1 \leq k$) should be embedded, said information $p_1 - p_k$ specifying an embedding format for embedding said digital watermark information $b_1 - b_n$ respectively in said areas $T_1 - T_n$;

recognizing the embedding format of the digital watermark information $b_1 - b_n$ in the areas $T_1 - T_n$ in the areas G in question; and

extracting the digital watermark information $b_1 - b_n$ from the areas $T_1 - T_n$, according to the recognized embedding format
~~The method of extracting digital watermark information according to Claim 6,~~

wherein:

for each of the plurality of groups G recognized, the information $p_1 - p_k$ embedded in the areas $J_1 - J_k$ is extracted to recognize a pattern of increasing/decreasing directions of pixel data values for a bit value of the digital watermark information, in the area G in question; and

each bit value of the digital watermark information $b_1 - b_n$ embedded in the areas $T_1 - T_n$ is detected according to the recognized pattern of increasing/decreasing directions.

8. – 10. (canceled)

11. (currently amended) A program product for making a computer execute a method of embedding digital watermark information $b_1 - b_n$ ($2 \leq n$) in image data, comprising:

codes for dividing the image data into a plurality of areas S each consisting of $M \times N$ ($1 \leq M, N$) pixels;

codes for defining an area G consisting of $P \times Q$ ($1 \leq P, Q$) of the areas S;

codes for allocating each of the areas S constituting said area G to some one of: areas $T_1 - T_n$ whose pixel values are changed, areas $J_1 - J_k$ ($1 \leq k$) in which information $p_1 - p_k$ ($1 \leq k$) specifying an embedding format for embedding said digital watermark information $b_1 - b_n$, a bit value of the digital watermark information being 0 or 1, in said areas $T_1 - T_n$, and areas $H_1 - H_m$ ($1 \leq m$) whose pixel values are not changed;

codes for corresponding each of said $T_1 - T_n$ whose pixel values are changed, to each of said digital watermark information $b_1 - b_n$ and changing the pixel value of each area T according to a bit value;

codes for locating one or more areas $T_1 - T_n$, and areas $J_1 - J_k$ in a predetermined same arrangement in said area G;

codes for locating said area G repeatedly over entire image data;~~The program product according to Claim 10,~~

~~further comprising:~~

codes for embedding said digital watermark information $b_1 - b_n$ by increasing or decreasing pixel data values in the corresponding areas $T_1 - T_n$ according to a bit value (0, 1) of each bit of the digital watermark information $b_1 - b_n$; ~~and~~

codes for embedding said information $p_1 - p_k$ specifying said embedding format such that said information indicates a pattern of respective increasing/decreasing directions in the areas $T_1 - T_n$ for a bit value of the digital watermark information, in each area G to which the areas $J_1 - J_k$ embedded with said information $p_1 - p_k$ belong; and

a computer readable storage medium for holding the codes.

12. – 14. (canceled)

15. (currently amended) A program product for making a computer execute a method of extracting digital watermark information $b_1 - b_n$ ($2 \leq n$), a bit value of the digital watermark information being 0 or 1, from image data in which said digital watermark information is embedded, comprising:

codes for dividing the image data into a plurality of areas S each consisting of $M \times N$ ($1 \leq M, N$) pixels;

codes for detecting areas $H_1 - H_m$ ($1 \leq m$) in which any of bit information 0 and 1 is not embedded, from said plurality of areas S codes for recognizing a plurality of areas G each consisting of $P \times Q$ ($1 \leq P, Q$) of the areas S , said plurality

of areas G being located on said image data, and said recognition being carried out by comparing locations of said detected areas $H_1 - H_m$ on said image data and locations of predetermined areas $H_1 - H_m$ in the areas S;

codes for extracting, in each of the plurality of areas G recognized, information $p_1 - p_k$ ($1 \leq k$) from areas $J_1 - J_k$ in which said information $p_1 - p_k$ ($1 \leq k$) should be embedded, said information $p_1 - p_k$ specifying an embedding format for embedding said digital watermark information $b_1 - b_n$ respectively in said areas $T_1 - T_n$;

codes for recognizing the embedding format of the digital watermark information $b_1 - b_n$ in the areas $T_1 - T_n$ in the area G in question;

codes for extracting the digital watermark information $b_1 - b_n$ from the areas $T_1 - T_n$ according to the recognized embedding format;~~The program product according to Claim 14,~~

~~further comprising:~~

codes for extracting, for each of the plurality of groups G recognized, the information $p_1 - p_k$ embedded in the areas $J_1 - J_k$ to recognize a pattern of increasing/decreasing directions of pixel data values for a bit value of the digital watermark information, in the area G in question, and to detect each bit value of the digital watermark information $b_1 - b_n$ embedded in the areas $T_1 - T_n$ according to the recognized pattern of increasing/decreasing directions; and

a computer readable storage for holding the codes.

16. - 18 (canceled)

19. (currently amended) An apparatus for embedding digital watermark information $b_1 - b_n$ ($2 \leq n$) in image data, comprising:

a processing part for dividing the image data into a plurality of areas S each consisting of $M \times N$ ($1 \leq M, N$) pixels;

a processing part for defining an area G consisting of $P \times Q$ ($1 \leq P, Q$) of the areas S;

a processing part for allocating each of the areas S constituting said area G to some one of: areas $T_1 - T_n$ whose pixel values are changed, areas $J_1 - J_k$ ($1 \leq k$) in which information $p_1 - p_k$ ($1 \leq k$) specifying an embedding format for embedding said digital watermark information $b_1 - b_n$ in said areas $T_1 - T_n$, and areas $H_1 - H_m$ ($1 \leq m$) whose pixel values are not changed;

a processing part for corresponding each of said $T_1 - T_n$ whose pixel values are changed, to each of said digital watermark information $b_1 - b_n$ and changing the pixel value of each area T according to a bit value;

a processing part for locating one or more areas $T_1 - T_n$, one or more areas $J_1 - J_k$ and one or more areas $H_1 - H_m$ in a predetermined same arrangement in said area G;

a processing part for locating said area G repeatedly over entire image data;

~~The apparatus for embedding digital watermark information according to Claim 18,~~

~~further comprising:~~

a processing part for embedding said digital watermark information $b_1 - b_n$ by increasing or decreasing pixel data values in the corresponding areas $T_1 - T_n$ according to a bit value (0, 1) of each bit of the digital watermark information $b_1 - b_n$; and

a processing part for embedding said information $p_1 - p_k$ specifying said embedding format such that said information indicates a pattern of respective increasing/decreasing directions in the area $T_1 - T_n$ for a bit value of the digital watermark information, in each area G to which the areas $J_1 - J_k$ embedded with said information $p_1 - p_k$ belong.

20. - 22 (canceled)

23. (currently amended) An apparatus for extracting digital watermark information $b_1 - b_n$ ($2 \leq n$), a bit value of the digital watermark information being 0 or 1, from image data in which said digital watermark information is embedded, comprising:

a processing part dividing the image data into a plurality of areas S each consisting of $M \times N$ ($1 \leq M, N$) pixels;

a processing part for detecting areas $H_1 - H_m$ ($1 \leq m$) in which any of bit information 0 and 1 is not embedded, from said plurality of areas S ;

a processing part for recognizing a plurality of areas G each consisting of $P \times Q$ ($1 \leq P, Q$) of the areas S, said plurality of areas G being located repeatedly over entire said image data, and said recognition being carried out by comparing locations of said detected areas $H_1 - H_m$ on said image data and locations of predetermined areas $H_1 - H_m$ in the areas S; a processing part for extracting, in each of the plurality of areas G recognized, information $p_1 - p_k$ ($1 \leq k$) from areas $J_1 - J_k$ in which said information $p_1 - p_k$ ($1 \leq k$) should be embedded, said information $p_1 - p_k$ specifying an embedding format for embedding said digital watermark information $b_1 - b_n$ respectively in said areas $T_1 - T_n$;

a processing part for recognizing the embedding format of the digital watermark information $b_1 - b_n$ in the areas $T_1 - T_n$ in the area G in question;

a processing part for extracting the digital watermark information $b_1 - b_n$ from the areas $T_1 - T_n$, according to the recognized embedding format; and

~~The apparatus for extracting digital watermark information according to Claim 22,~~

~~further comprising:~~

a processing part for extracting, for each of the plurality of groups G recognized, the information $p_1 - p_k$ embedded in the areas $J_1 - J_k$, to recognize a pattern of increasing/decreasing directions of pixel data values for a bit value of the digital watermark information, in the area G in question, and to detect each bit value of the digital watermark information $b_1 - b_n$ embedded in the areas $T_1 - T_n$, according to the recognized pattern of increasing/decreasing directions.

24. – 26. (canceled)